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November 8, 2013

SUBMITTED ELECTRONICALLY VIA ECFS

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Notice of Ex Parte Presentation

ET Docket No. 13-49, ***Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band***
IB Docket No. 13-213, RM-11685, ***Terrestrial Use of the 2473-2495 MHz Band for Low-Power Mobile Broadband Networks; Amendments to Rules for the Ancillary Terrestrial Component of Mobile Satellite Service Systems***
GN Docket No. 12-268, ***Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions***
GN Docket No. 12-354, ***Amendment of the Commission's Rules with Regard to Commercial Operations in the 3550-3650 MHz Band***
ET Docket No. 07-113, RM-11104, ***Revision of Part 15 of the Commission's Rules Regarding Operation in the 57-64 GHz Band***

Dear Ms. Dortch:

On November 6, 2013, representatives of the Wi-Fi Alliance shown on the attached list met with staff from the Office of Engineering and Technology, also shown on the attached list.

The attached presentations were distributed.[1/] With respect to proceedings before the Commission:

- The Wi-Fi Alliance noted the importance of the 5 GHz band for Wi-Fi growth, particularly to accommodate wider bandwidths which devices that use IEEE 802.11ac technology will employ. The Wi-Fi Alliance urged the Commission to take a sequenced approach to adopting rules in the 5 GHz proceeding, acting first where there is agreement among the parties and leaving for another phase of this proceeding matters such as the use of the U-NII-4 and U-NII-2B bands, which require further study. The parties noted rules governing existing Wi-Fi spectrum that can be amended to make more intense use of the 5 GHz U-NII bands. For example, the Commission should raise the power

[1/] Pages from one of the presentations have been deleted because they do not relate to the merits or outcome of a Commission proceeding and are otherwise Wi-Fi Alliance confidential information.

permitted in the U-NII-1 band and eliminate the outdoor use restriction. The proposed rules for other U-NII bands are sufficient to address any claims of harmful interference caused by Wi-Fi devices.

- The parties noted their continued concern about the proposal by Globalstar, Inc. to more intensely employ the 2.4 GHz band used in Wi-Fi devices. The Wi-Fi Alliance expects to further evaluate the Commission's recently released Notice of Proposed Rulemaking responsive to Globalstar's request to determine the impact on Wi-Fi operations.
- The Wi-Fi Alliance supported the designation of spectrum for unlicensed operations in the 600 MHz band. The parties stated that the Commission should make four channels six megahertz wide available to take advantage of legacy 20 megahertz wide Wi-Fi standards.
- The parties noted their support for unlicensed use in the 3.5 GHz band for small cell operations and asserted that the need to protect incumbent satellite operations is overstated.
- The Wi-Fi Alliance noted its support for the Commission's actions adopting rules permitting the expanded use of the 57-64 GHz band. The parties observed that while the Commission recently eliminated ambiguities related to the outdoor use of the band, additional rule modifications may be required to permit use of the band in aircraft.

Pursuant to Section 1.1206(b)(2) of the Commission's rules, an electronic copy of this letter and the attachment is being filed for inclusion in the above-referenced dockets. Copies of this letter and the attachments are being provided to all Commission employees who attended the meeting. Please direct any questions regarding this filing to the undersigned.

Very truly yours,

/s/ Russell H. Fox

Russell H. Fox

Attachments

cc: FCC employees shown on the attached list, with attachments (via e-mail)

MEETING ATTENDEES
WI-FI ALLIANCE/OFFICE OF ENGINEERING AND TECHNOLOGY
NOVEMBER 6, 2013

WI-FI ALLIANCE ATTENDEES

Edgar Figueroa – Chief Executive Officer, Wi-Fi Alliance
Greg Ennis – Technical Director, Wi-Fi Alliance
Mary Brown – Cisco Systems, Inc.; Member, Wi-Fi Alliance
Vijay Auluck – Intel Corporation; Member, Wi- Fi Alliance
Rob Kubik – Samsung; Member, Wi-Fi Alliance
Scott Blue – Microsoft Corporation; Member, Wi-Fi Alliance
Bill Carney – Sony Electronics, Inc.; Member, Wi-Fi Alliance
Alan Norman – Google Inc.; Member, Wi-Fi Alliance
Chuck Eger – Motorola Mobility LLC; Member, Wi-Fi Alliance
Russell Fox – Mintz Levin, Counsel to the Wi-Fi Alliance

OET ATTENDEES

Julius Knapp
Geraldine Matise
Ira Keltz
Rashmi Doshi
Aole Wilkins
Mark Settle
Navid Golshahi
Karen Rackley
Walter Johnston
Ronald Repasi

Wi-Fi Alliance Meeting with the FCC Office of Engineering Technology

Technology Update

November 6, 2013

Attendees

Wi-Fi Alliance Representatives

Edgar Figueroa, CEO, Wi-Fi Alliance

Greg Ennis, Technical Director, Wi-Fi Alliance

Bill Carney (Sony), Wi-Fi Alliance BoD Regulatory Advisor

Russell Fox (Mintz Levin, counsel for WFA)

Wi-Fi Alliance Member Company Representatives

Mary Brown (Cisco)

Rob Kubik (Samsung)

Vijay Auluck (Intel)

Scott Blue (Microsoft)

Alan Norman (Google)

Chuck Eger (Motorola)

Wi-Fi Alliance

- Model collaboration forum of more than 600 member companies, enabling Wi-Fi® adoption
- 195 US member companies
- Wi-Fi CERTIFIED™: a world-class interoperability validation program that delivers the best user experience and promotes accelerated adoption of new technology
- More than 20 distinct initiatives underway in 2013

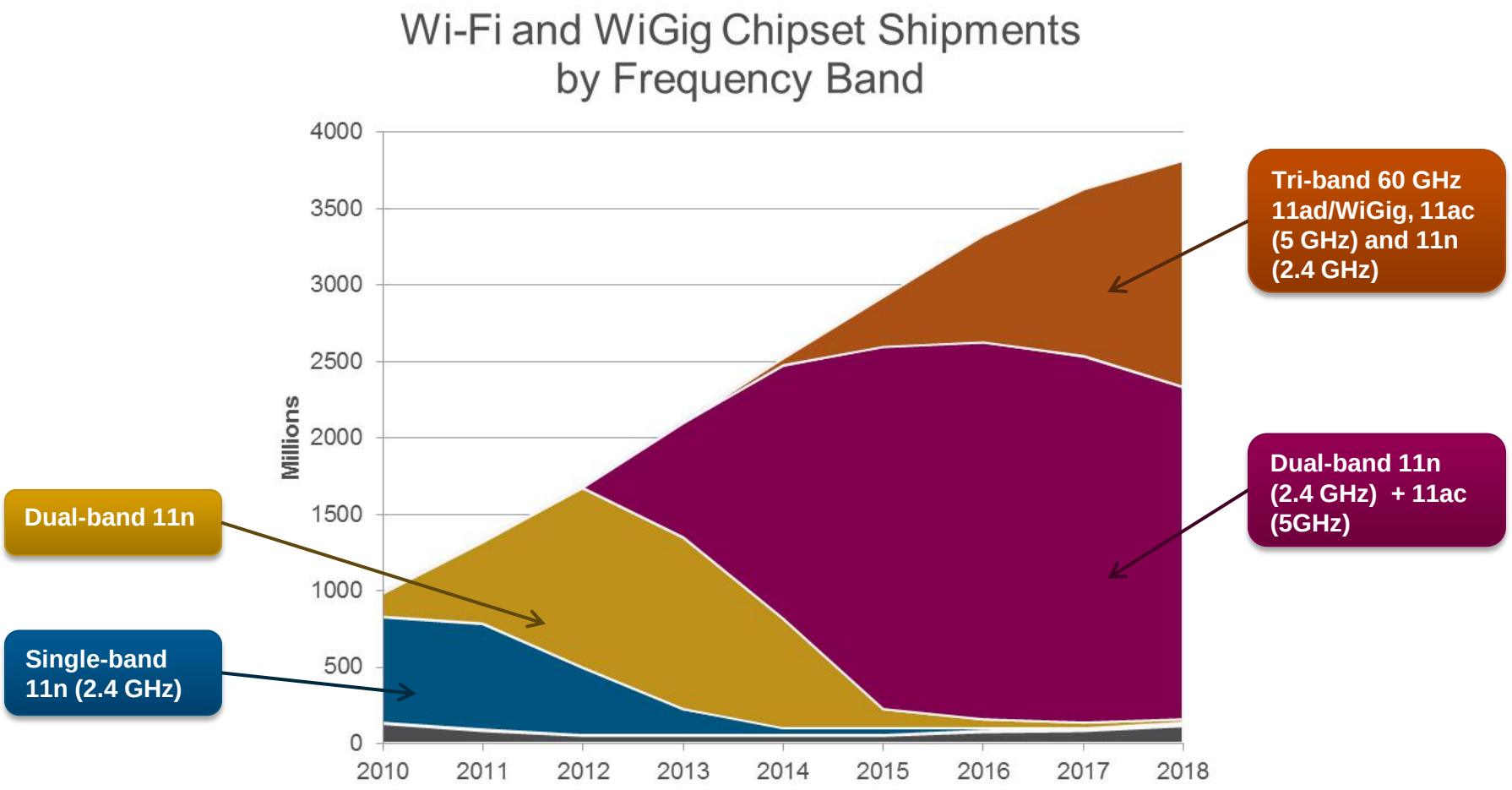
Agenda

- Overview of Current Wi-Fi Certification Programs
- Wi-Fi Alliance Certification Roadmap
- Wi-Fi Direct and TDLS in 5 GHz
- Technologies on the Horizon
- 57-64 GHz Band Clarification Request

Wi-Fi Alliance certification and market-enabling programs

Wi-Fi CERTIFIED™ programs	
Wi-Fi CERTIFIED™ a/b/g/n/ac	
WPA2™	Tunneled Direct Link Setup
Voice-Personal	Voice-Enterprise
WMM®-Power Save	WMM®-Admission Control
Wi-Fi Protected Setup™	Passpoint™
CWG-RF	Miracast™
WMM® (Wi-Fi Multimedia™)	Protected Management Frames
Wi-Fi Direct®	IBSS with Wi-Fi Protected Setup™

Chipset Shipments surpass 2B in 2013



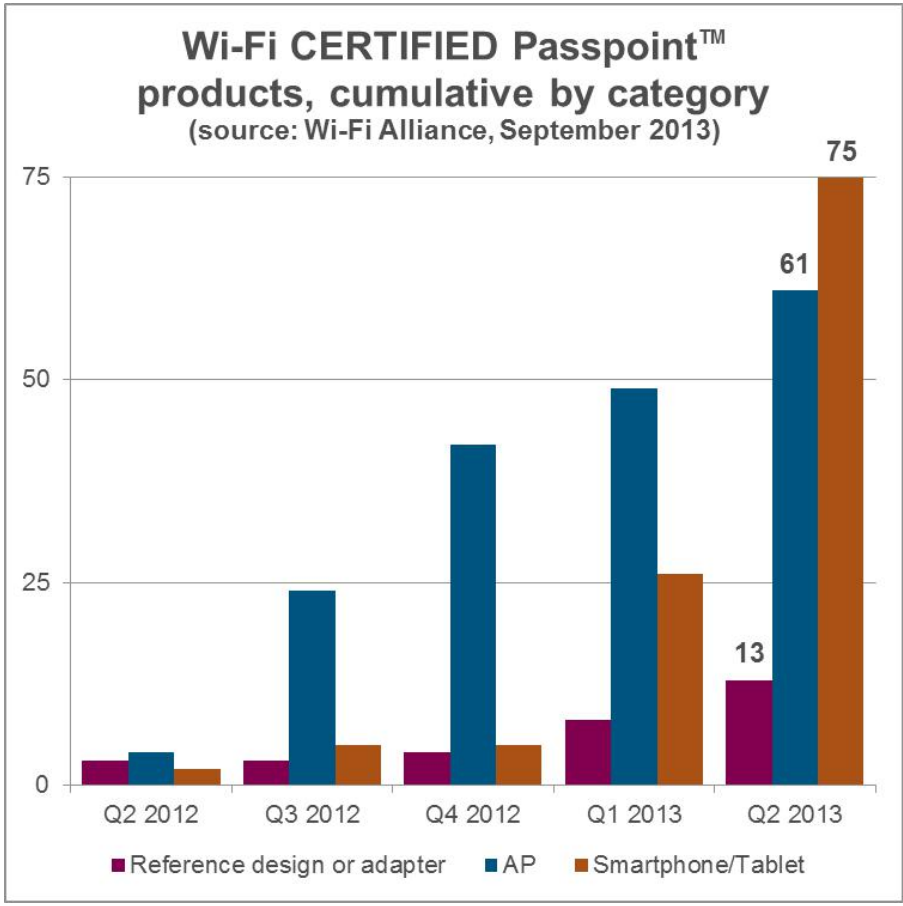
Source: ABI Research, August 2013

Wi-Fi CERTIFIED ac: Update

- Wi-Fi Alliance launched ac certification in June 2013
- >190 products already certified
- Builds on Wi-Fi CERTIFIED n and interoperates with legacy 5 GHz devices
- Dual-band (2.4 and 5 GHz) networking products will be very widespread
- Wi-Fi CERTIFIED ac products will be useful to address congestion and improve performance
- Mobile device vendors are implementing ac now in smartphones and tablets
- ABI Research: 40% of smartphones will support ac this year

Wi-Fi CERTIFIED Passpoint™: Update

- Wi-Fi CERTIFIED Passpoint devices deliver an automated, security-protected connection experience in service provider hotspots
- Certification program was launched in 2012
- Trials are ongoing, operational deployments are beginning
  - First Passpoint network: “Boingo Passpoint”
- ~75 Passpoint-certified mobile products today
- Passpoint Release 2, coming mid-2014, adds features to support creation of new accounts on-the-spot, and makes it easier for users to find hotspots recommended by their service provider



Wi-Fi CERTIFIED Miracast™: Update

- Certification Program was launched in 2012
- > 1100 products certified
- Connect devices for a rich audio/video experience without cables or a connection to an existing Wi-Fi network
  - Watch videos from a smartphone on a big screen television
  - Share a laptop screen with the conference room projector
- Miracast certified products entering the market in volume this year

WiGig CERTIFIED: Update

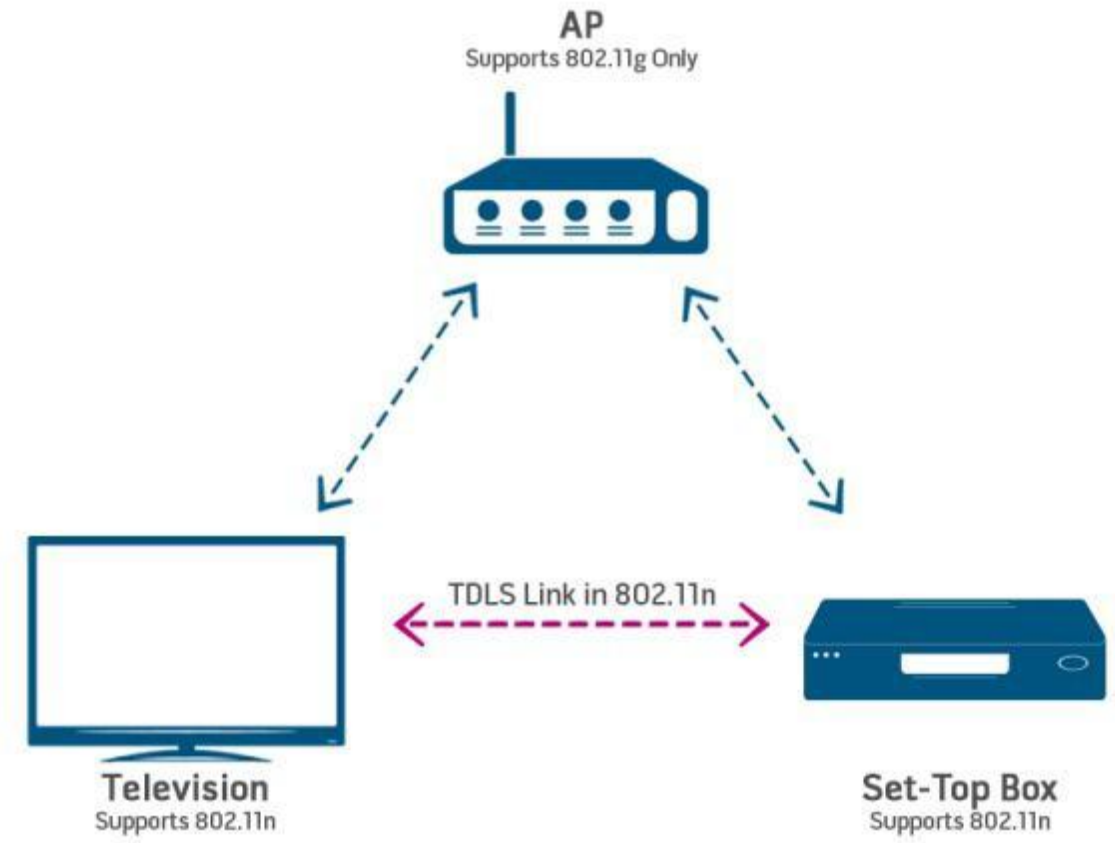
- 60 GHz connectivity for very high speed applications such as multimedia and docking
- Based on IEEE 802.11ad
- Wi-Fi Alliance and WiGig Alliance have unified
  - The integration of WiGig Alliance into Wi-Fi Alliance is complete
- First interoperability certification program expected to launch in 2014
- WiGig CERTIFIED™ will be the certification brand for products approved in the program and a new certification logo has also been developed

Wi-Fi Direct / TDLS in 5 GHz

MAINTAINING DFS PROTECTIONS IN GROUP OWNERS

TDLS Questions Raised by FCC

TDLS links enable devices to perform at the highest level of shared capabilities, regardless of the capabilities of the AP. In the setup process, devices exchange their capabilities. If both devices support more advanced capabilities than the AP, then the communication on the direct link can be at this higher level. For example, if the AP only supports 802.11g and the two TDLS devices support 802.11n, then the devices can communicate at higher 802.11n data rates over the direct link.



How to ensure that Wi-Fi Direct and TDLS devices do not operate in DFS bands without radar detection capability?

Wi-Fi Alliance Answers

- **Wi-Fi Alliance does not ensure regulatory compliance, but does continually remind its member companies of *their responsibilities* in terms of ensuring that all of their Wi-Fi Certified devices comply with relevant regulatory rules. We also keep our members apprised of regulatory changes, and alert them to issues that may require special consideration, e.g. Wi-Fi Direct in the 5 GHz bands.**
- **We have updated our Wi-Fi Direct member letter to also reference TDLS, and have distributed it to our members**

Wi-Fi Direct in DFS Bands

- **Required to be under control of a DFS Master**
  - FCC concern is prevention of interference with radars, utilizing DFS
  - Wi-Fi Alliance will make members aware of how the FCC believes this should be accomplished
  - Wi-Fi Alliance understands that a Group Owner (GO) associated with a DFS Master, should be able to control low-power Wi-Fi Direct clients that follow the lead of the GO
  - Under this arrangement, the DFS master ensures that all DFS control and timing would be observed by client devices
  - Wi-Fi Alliance understands that FCC contemplates issuing proposed modification to four KDBs that cover this issue.
    - It looks forward to commenting on the draft KDBs.

Future Directions

KEEPING UP WITH NEW TECHNOLOGIES ON THE HORIZON

Future Considerations

- **IEEE 802.11ac with 160 MHz wide channels**
  - Are there any OET concerns regarding the use of these very wide channels?
- **IEEE 802.11ac with DSRC coexistence mechanisms**
  - Outcome of work with the automotive industry will result in a new version of 802.11ac
  - Future version of Wi-Fi CERTIFED ac may incorporate this to support use of U-NII-4 band

R&O FCC 13-112

REVISION OF PART 15 OF THE COMMISSION'S RULES REGARDING OPERATION IN THE 57-64 GHZ BAND

Clarification of Outdoor Use Limits

- **Wi-Fi Alliance supports FCC action making this band available**
- **However, decision contains ambiguity regarding outdoor use**
  - Page 27 it states:
    "(b) Within the 57-64 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power (EIRP):
    (1) Products other than fixed field disturbance sensors shall comply with one of the following emission limits, as measured during the transmit interval:
    (i) Except as indicated in paragraph (ii) below, the average power of any emission shall not exceed 40 dBm and the peak power of any emission shall not exceed 43 dBm.
    (ii) For transmitters located outdoors, the average power of any emission shall not exceed 82 dBm minus 2 dB for every dB that the antenna gain is less than 51 dBi. The peak power of any emission shall not exceed 85 dBm minus 2 dB for every dB that the antenna gain is less than 51 dBi."
  - It appears that any device developed for 'indoor' operation which is then deployed 'outdoors' (e.g., a smartphone, tablet or other CE device) would have to comply and since the antenna gains of such devices are relatively low, the allowable EIRP will be significantly reduced.

Potential Modification 15.255

- Section 15.255 states that operation is not permitted for equipment used on aircraft or satellites
- This may soon become problematic.
- 60 GHz technology will be integrated in many consumer electronics devices along with Wi-Fi. Today, 60 GHz for consumer electronics use is where Wi-Fi was several years ago.
- These devices, like devices with Wi-Fi today, will soon be carried on board aircraft.
- 15.255 will require modification and Wi-Fi Alliance urges the Commission to initiate that change.

Wi-Fi Alliance
Meeting with FCC Office of Engineering and Technology– Spectrum Issues

November 6, 2013

Attendees

Wi-Fi Alliance Representatives

Edgar Figueroa, CEO, Wi-Fi Alliance

Greg Ennis, Technical Director, Wi-Fi Alliance

Bill Carney (Sony), Wi-Fi Alliance BoD Regulatory Advisor

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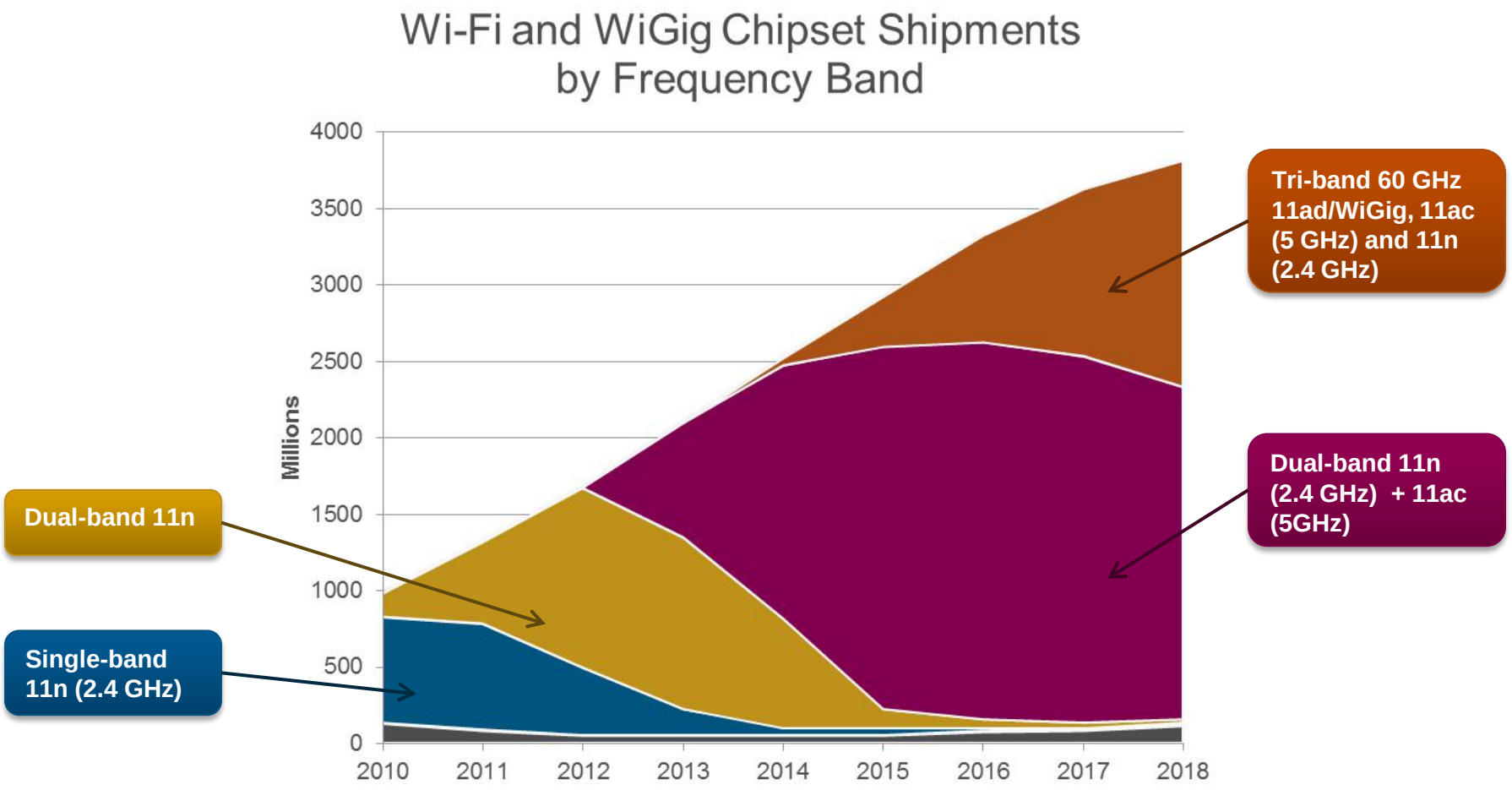
More Spectrum is Needed for Wi-Fi

- **Since 2001, Wi-Fi device shipments have experienced nearly double-digit annual growth**
- **One in six people use Wi-Fi at home, at work and on the move**
- **In 2012, Wi-Fi carried 69 percent of the traffic generated by smartphones and tablets and was responsible for carrying 57% of traffic for PCs and laptops**
- **Wi-Fi contributes upwards of $50 billion in annual economic growth**
- **New Wi-Fi standards (primarily 802.11ac) will drive Wi-Fi growth further**
- **These new technologies require not only more spectrum but wider bandwidths**

Chipset Shipments surpass 2B in 2013



Source: ABI Research, August 2013

5 GHz is a Key Component for Wi-Fi Growth

- The FCC Should Take a Sequenced Approach to the 5 GHz Proceeding.
  - Wi-Fi Alliance realizes that not all components are immediately achievable. For example, U-NII-4 and U-NII-2B band availability will require additional study
  - There are certain actions the FCC can and should take right away:
    - Harmonize U-NII-3 and U-NII-2C rules under 15.407
    - Adopt the proposed rules that will improve DFS operations in the UNII-2A and U-NII-2C bands
    - Adopt the proposed changes to the U-NII-1 bands

Proposed Changes to the U-NII-3 and U-NII-2C Bands

- FCC should adopt as a group, the rules targeted to resolve interference concerns and promote greater use of the spectrum
  - Unified set of equipment authorization rules for U-NII-2C and U-NII-3 bands under Section 15.407
    - The increased antenna gain necessary for point-to-point links is not necessary and may threaten TDWR protection
  - Expand the U-NII-3 band by 25 megahertz, creating a 380 megahertz block of spectrum for Wi-Fi
  - Improved security features so that devices only operate in bands for which they are authorized
  - Improved "Bin 1" testing requirements
  - Formalize previous staff guidance on ability to initiate transmission in a mode that does not include DFS where DFS operations are required
  - These changes will address interference to radar operations in the U-NII-2C band and make the band fully available (it has not been since 2010)
  - No emission limits and frequency separation requirements will be needed
  - FCC should investigate whether low power operations in the U-NII-2A and U-NII-2C bands are possible without DFS

Adoption of the Proposed Rules Make Additional Measures Unnecessary

- In the past, interference to TDWR came from two primary sources – devices without DFS capabilities operating in bands that require DFS and modification of devices to disable DFS
  - The proposed rules address both of these issues
  - In addition, application of Section 15.407 rules and Bin 1 testing will better protect TDWR
  - There is simply no evidence that U-NII devices with properly equipped DFS capabilities interfere with TDWR facilities
- If U-NII devices operate with DFS capabilities across the U-NII-2A and U-NII-2C bands, geolocation and database requirements are unnecessary
- The alternative proposal to lower emission limits to protect TDWR is unnecessary
- The Commission should also decline to adopt its proposal on sensing.
- Wi-Fi Alliance endorses Fastback proposal allowing use of devices that can detect specific frequencies.

The Commission Should Modify the U-NII-1 Rules

- Wi-Fi Alliance supports change to match either U-NII-2A or U-NII-3 rules.
  - Increase permitted power
  - Eliminate outdoor restrictions
- The band is underutilized and could be used to support 802.11ac operations across the U-NII-1 and U-NII-2A bands
- Globalstar's operations will not be affected by change in rules

U-NII-4 Band

- Wi-Fi Alliance recognizes that DSRC operations must be protected
  - Wi-Fi has successfully shared with other services; it can share with DSRC or others (like C-Band satellite systems) that are in the band
- FCC should promote an interactive dialogue among stakeholders
- DFS requirements should not automatically be imported to the U-NII-4 band
- Wi-Fi Alliance has established a Automotive Segment Marketing Task Group that will, among other things, work with industry to drive a consensus solution for coexistence with DSRC

U-NII-2B Band

- Wi-Fi Alliance recognizes the need to protect incumbent federal operations
- Wi-Fi Alliance believes more study is needed before this band can be shared, and will work with others already engaged in this research
- There is no reason to believe that non-government TDWR systems cannot be protected with DFS as well as government systems have been protected to date
- While Wi-Fi Alliance agrees with rules tentatively proposed, it opposes out-of-channel emission limits to outdoor devices

Other 5 GHz Matters

- Generally support other rule changes.
- Generally support proposed transition periods.
- The FCC should not wait until WRC-15 to proceed.
- There should be no priority access rules for healthcare or other industry segments.
- NTIA Report
  - Generally agree with recommendations, although Wi-Fi Alliance does not believe that use of geolocation, sensing or database technologies is necessary to protect incumbent users.
  - Strongly disagree with assertion that DFS does not work.

Other 5 GHz Matters

- Replace the phrase “Peak Power Spectral Density” with “Maximum Power Spectrum Density” in Section 15.403
- Modify subsection(s) to include the 5.825-5.850 MHz spectrum in the definition of U-NII spectrum
- Modify the general technical requirements in Section 15.407, including the deletion of the second sentence in paragraph (a)(4), the replacement of “peak” with “maximum” in paragraph (a)(5), and the clarification in paragraph (a)(6) that all peak excursion measurements are to the highest average rather than to the average in each corresponding 1 megahertz band
- Clarify that the 20 dB bandwidth limitation for ultrawideband devices does not apply to 15.407 devices
- Change in-band PSD limits from 8 dBm/3 kHz to 23.2 dBm/100 kHz for the below 1 GHz unlicensed bands that are not part of Subpart H of Part 15 of the rules

Globalstar Petition for Rulemaking

- The Globalstar proposal should not prevent non-TLPS Wi-Fi from utilizing the 2473-2483 MHz band, as technology advances could enable these channels to be used on an unlicensed basis
- Globalstar's plan includes agreement to accept Wi-Fi interference from Wi-Fi Channel 11. The Commission should likewise require it to accept interference from possible future operations on Wi-Fi Channels 12 and 13
- Globalstar is proposing a previously unanticipated use of the spectrum between 2483.5 MHz to 2495 MHz (i.e. TLPS in Wi-Fi Channel 14). Existing out-of-band emissions rules for the upper portion of the ISM band were intended to protect Mobile Satellite Services in the adjacent band. Therefore, the Commission should consider revising the band-edge restriction and OOBE limits specified in Parts 15.205 and 15.209 to enable the use of Wi-Fi Channels 12 and 13 by Wi-Fi and other unlicensed devices, provided that use does not interfere with Globalstar's licensed operation of TLPS in the upper half of Wi-Fi Channel 14

Incentive Auctions (600 MHz Band)

- **Wi-Fi Alliance Supports Making TV Spectrum Available for Unlicensed Use**
  - There has been little adoption of Wi-Fi in existing TV bands through TV white spaces devices.
  - A favorable channel map adopted as a result of the incentive auction proceeding can change the use of the TV bands for Wi-Fi use
- **The 600 MHz Band Should be Restructured to Make at least Four 6 Megahertz Channels Available for Unlicensed Operations in Densest Urban Environments**
  - Channel bandwidths of greater than 20 megahertz are the basis for legacy 802.11 networks.
  - Channels need not be contiguous

3550 to 3700 MHz

- **Wi-Fi can be a valuable technology for the 3550 to 3700 MHz band**
  - Billions of client devices already incorporate Wi-Fi
  - New standard development would be fairly straightforward
  - Conversion to / adding this band easier than incorporating completely new wireless technology
- **Wi-Fi Alliance could very rapidly develop a test plan for Wi-Fi devices in this band**
- **Therefore, Wi-Fi Alliance supports FCC proposal for new small-cell use of the band using cognitive devices**
- **In order to further promote the use of the band, the Commission should re-examine the protection required for FSS stations**